

# Soils and Environmental Quality

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ARB  
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## Short Outline

- What do soils do for us?
- Soils and environmental quality.
- What are soils?
- What is a "California soil"?
- What is soil quality?
- Conclusions

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## What do soils do for us?

- Grow food, fiber, biofuel (maybe)
- Substrate for waste disposal
- Filters water
- Substrate for building structures
- Basis for all natural terrestrial ecosystems--ecosystem services

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- Water
- Air
- Nutrients
- Support for plants
- Biological community (good and bad)

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## Soils and Environmental Quality?



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## Soils and Environmental Quality?



Image from the California Legislative Analyst's Office

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## What are Soils?

“A three dimensional, porous,  
environmental buffer”

The excited skin of the earth!

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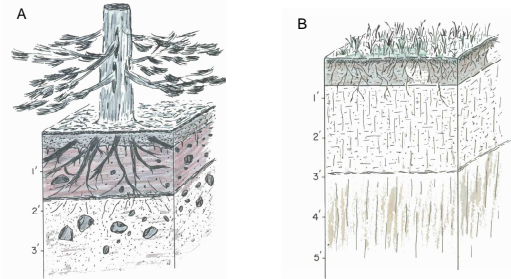
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## Pedons--the three-dimensional soil individual




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## Soil characteristics

- Three phase system
  - Solids
    - Inorganic
    - Organic (living and dead)
  - Liquids
    - Soil solution
  - Gases
    - Nitrogen, oxygen and carbon dioxide

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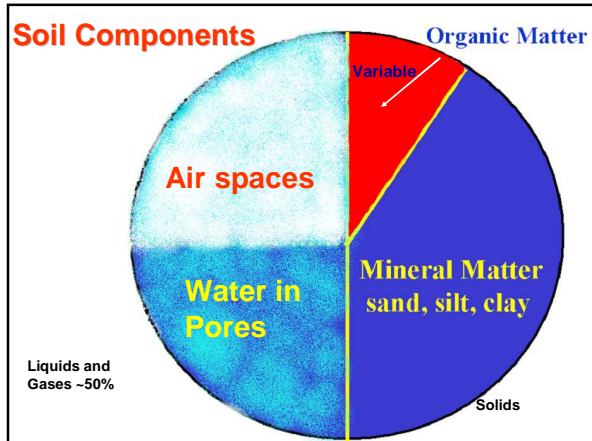
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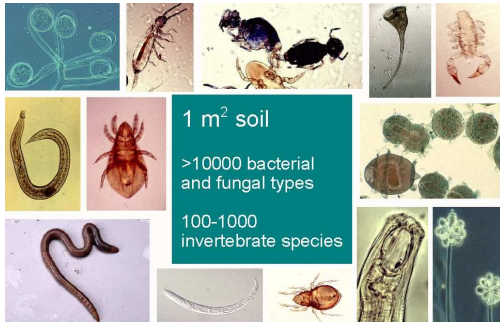
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## Biodiversity




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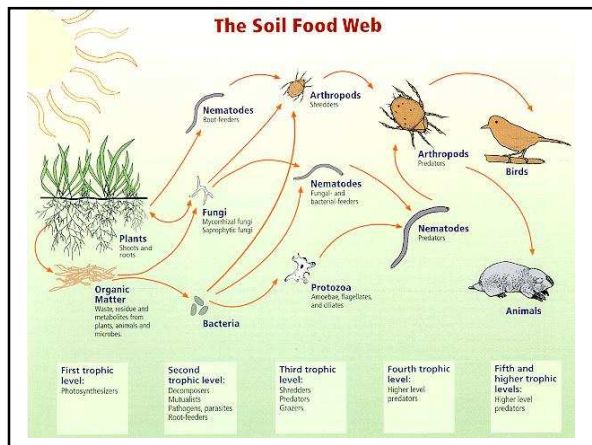
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## What is a “California” soil?

- Before defining soil quality, we need to answer this question.
- Trick question---no such thing exists.

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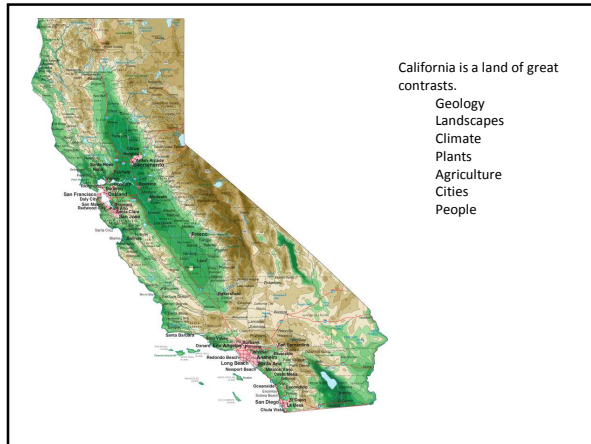
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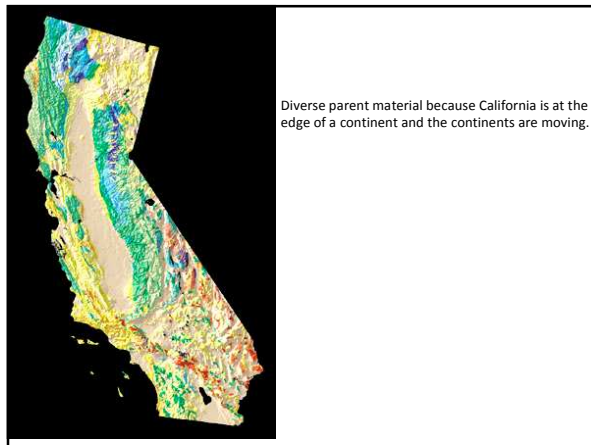
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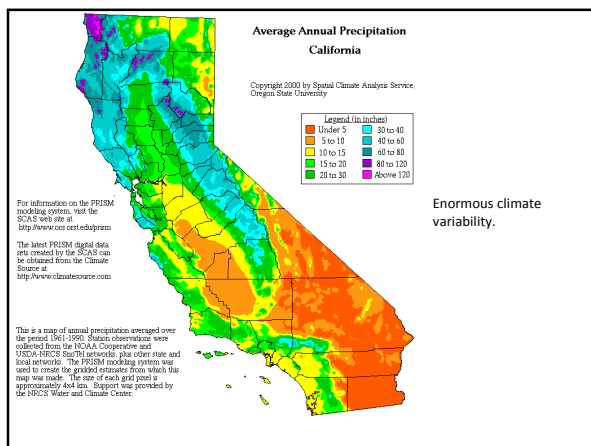
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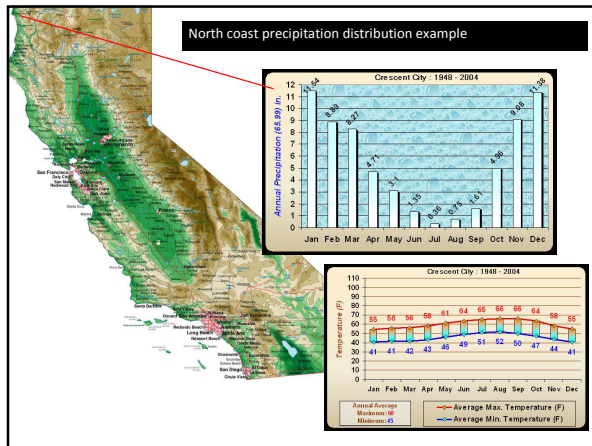
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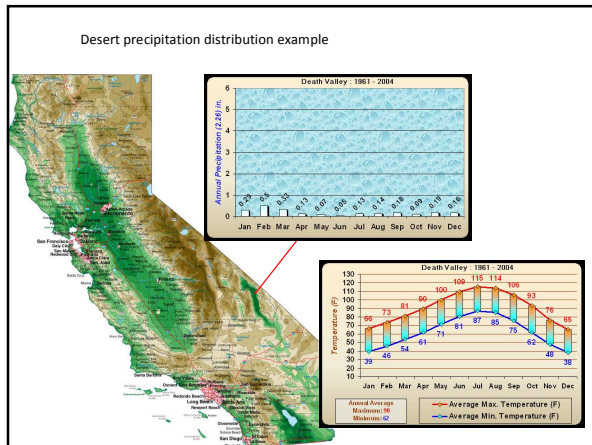
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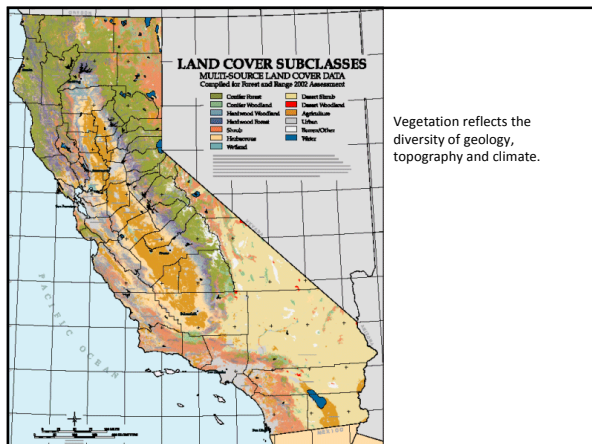
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Vegetation reflects the diversity of geology, topography and climate.

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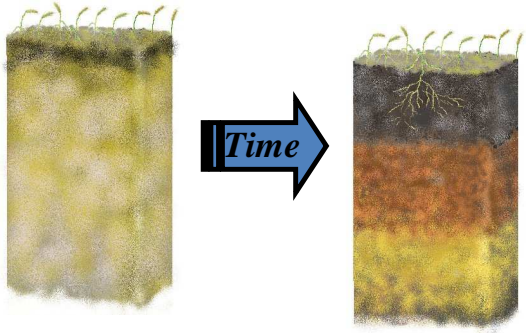
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## Soil Development



California parent materials vary in age from recent to ancient.

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## Soil Quality?

"The capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation" Soil Science Society of America

An "unofficial" definition. Can a soil be managed to produce a product with minimum environmental damage? Is the land use sustainable?

Let's look at some examples.

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## Defining Soil Quality

What soil properties define soil quality?

How does one quantify soil quality?

How does one combine quantitative measures of soil quality?

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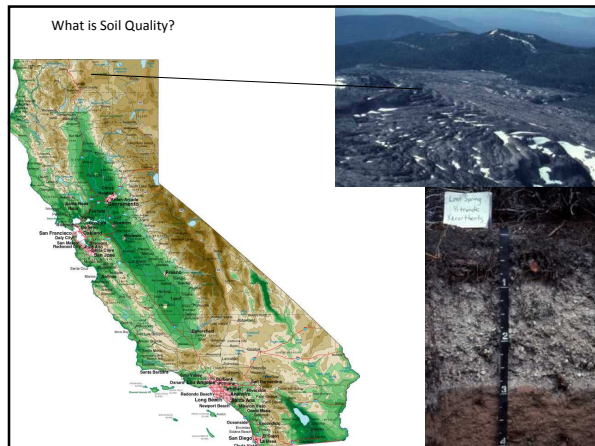
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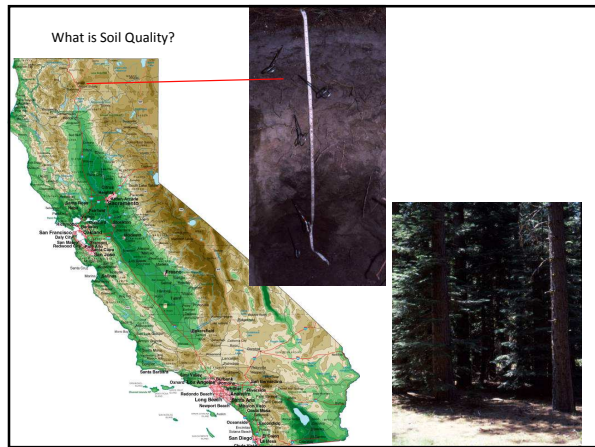
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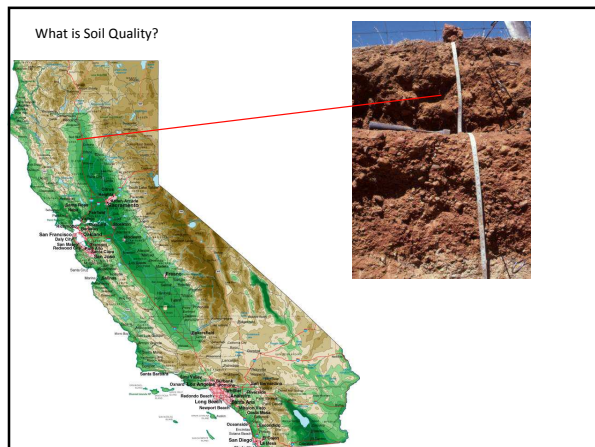
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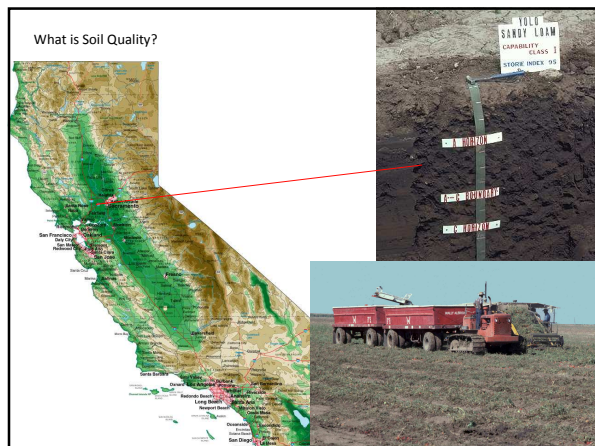
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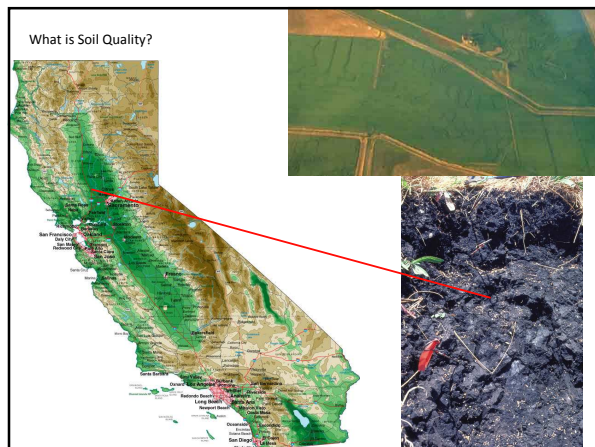
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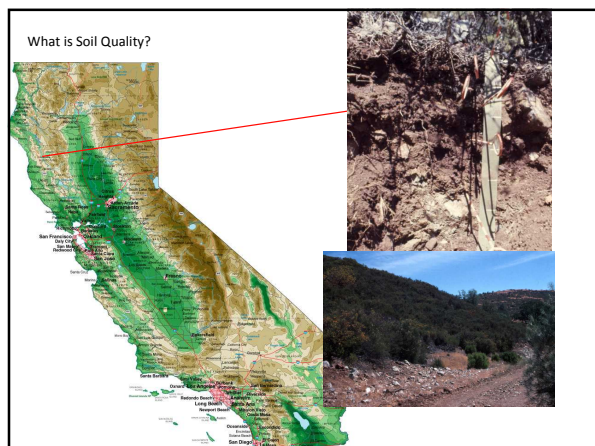
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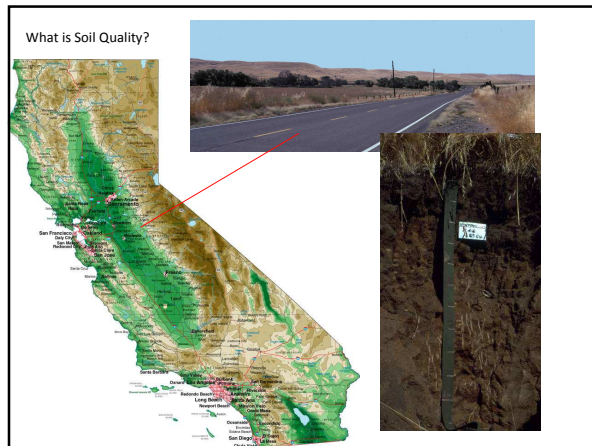
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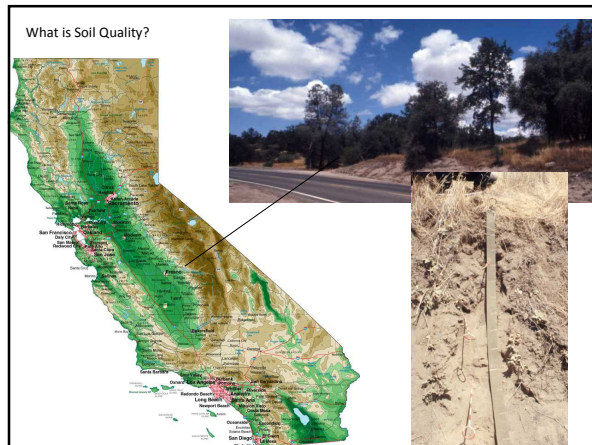
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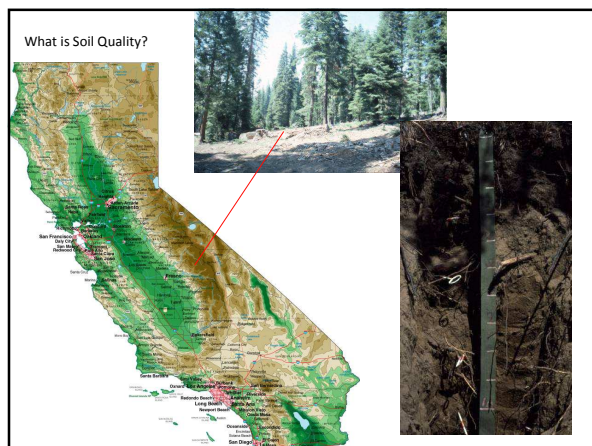
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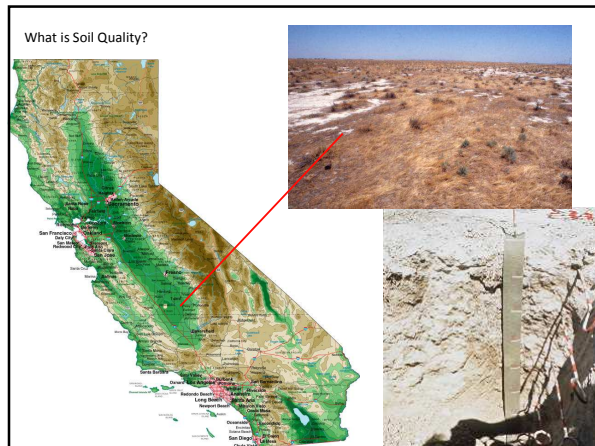
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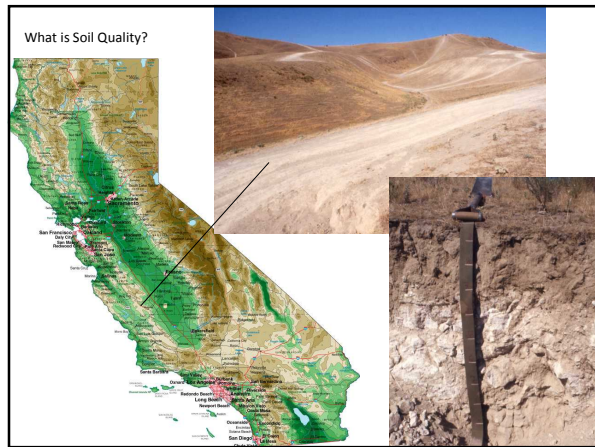
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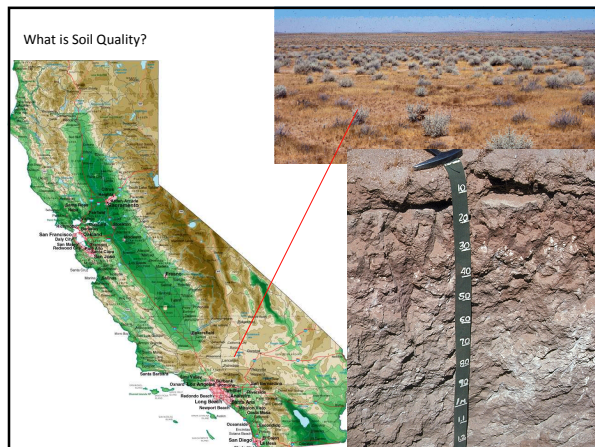
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## Soil/Land Capability?

- Many measures of land capability exist to help land managers make land use decisions.
- USDA Land Capability Classification
- Storie Index
- Site Index for forests

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## Conclusions

- Soils are thin covering on the earth's surface that support life at varying scales.
- Soils are three phase systems, solids, liquids and gasses.
- Soils are highly variable because they form under different climates, vegetation, landscapes, on different parent materials and over different time periods.
- Soil quality is difficult to define and nearly impossible to quantify.
- Many systems exist for rating soils for agricultural capability that will work for helping to select areas for biofuels and for managing the soils that are selected.

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